CLAIMS:

1. An actuating device for manually actuating driving and steering means for a wheeled, power driven object or vehicle, said actuating device comprising

a base member,

an actuating member having gripping means and being supported by the base member so as to be displaceable thereon along at least one plane,

at least first and second force transducers, the first transducer being arranged to receive a force component manually applied to the actuating member in a predetermined first direction only, along said plane, and the second force transducer being arranged to receive a force component manually applied to the actuating member in a predetermined second direction only, transversely to the first direction along said plane,

each of said at least first and second force transducers being adapted to generate an output signal to the driving and steering means responsive to the strength of the force component received.

2. An actuating device according to claim 1, wherein said predetermined first and second directions extend at mutual right angles.

3. An actuating device according to claim 1 or 2, wherein said first predetermined direction extends in the normal direction of travel of the vehicle.

4. An actuating device according to any of the claims 1-3, wherein said gripping means comprises a pair of mutually spaced gripping handles, which are fixedly mounted on the actuating member and symmetrically arranged in relation to said first predetermined direction, said first force transducer and a similar third force transducer being arranged symmetrically in relation to the said first predetermined direction, said third force transducer being arranged like the first force transducer to receive a force component manually applied to the actuating member in said predetermined first direction only.

5. An actuating device according to any of the claims 1-4, wherein each force transducer is fixedly mounted in relation to the base member, each force transducer having a force transmitting member extending into and engaging with the walls of an associated recess in the actuating member, said recess being shaped such that only a force component in the said predetermined direction may be transmitted from the actuating member to the force transducer via said transmitting member.

6. An actuating device according to any of the claims 1-5, wherein the force transducers comprise strain gauges.

7. An actuating device according to claim 6, wherein each force transducer comprises a cantilever beam having strain gauges mounted thereon, the force component from the actuating member being applied to the free end of the beam so as to generate bending stresses therein.

8. An actuating device according to any of the claims 1-7, wherein the actuating member is freely floating on a liquid film or layer.

9. An actuating device according to claim 8, wherein said liquid film or layer is a layer of viscous oil or grease.

10. An actuating device according to claim 9, wherein the liquid film or layer is a layer of damping grease.

11. An actuating device according to any of the claims 1-10, further comprising an electronic circuit for receiving the output signals from the force transducers and for processing these signals prior to transmitting them to the driving and steering system of the vehicle, so as to obtain substantially the same movement of the vehicle as if it had been manually driven by the forces applied to the gripping means, but in an intensified scale.

12. A method for manually actuating driving and steering means for a wheeled, power driven object or vehicle, said method comprising

applying a manual force to an actuating member,

decomposing the manual force into at least two components extending in mutually intersecting, predetermined directions,

applying each of said force components to a respective transducer, and

transmitting from each of said transducers to the steering system an output signal, which is responsive to the strength of the force component received by the transducer relating to the respective direction.

13. A method according to claim 12, wherein the manual force is applied to gripping means provided on the actuating member, which is supported by a base member so as to be freely displaceable thereon along a plane in said predetermined directions only.

14. A method according to claim 12 or 13, wherein said predetermined directions extend at mutual right angles.

15. A method according to any of the claims 12 - 14, wherein one of said predetermined directions extends in the normal direction of travel of the vehicle.

16. A method according to any of the claims 13-15, wherein the actuating member is freely floating on a liquid film or layer.

17. A method according to claim 16, wherein said liquid film or layer is a layer of viscous oil or grease.

18. A method according to claim 17, wherein the liquid film or layer is a layer of damping grease.

19. A method according to any of the claims 12 – 18, wherein the transducer stiffness and the mass of the control plate are combined so as to obtain a natural frequency of resonance of the movable parts of the actuator device substantially exceeding frequencies of environmental vibrations.

20. A method according to claim 18 or 19, wherein the liquid layer is arranged so as to provide critical or just overcritical damping of the natural free resonance vibrations.

21. A method according to any of the claims 12-20, wherein the output signals from the transducers are transmitted to an electronic circuit, in which these signals are processed prior to further transmitting them to a driving and steering system of a wheeled vehicle, so as to obtain substantially the same movement of the vehicle as if it had been manually driven by the force applied to the actuating member, but in an intensified scale.

22. A drive wheel system for supporting and driving an object, said wheel system comprising:

at least two separate wheeled units or bogies to be mounted at selected locations on the object to support the same, each unit or bogie including a frame, at least one wheel member rotatably mounted in relation to the frame, driving means for rotating the wheel member(s) in relation to the frame, and steering means for moving the wheel member(s) in desired directions in relation to the frame,

electronic control means for controlling the function of the driving and steering means of said wheeled units or bogies and including

a pre-programmed bogie control device at each of said wheeled units or bogies, signal transmitting means, and a pre-programmed central control unit for outputting command signals to each of the pre-programmed bogie control devices via the signal transmitting means in response to input command signals received, and

an actuating device according to any of the claims 1-11, the output signals generated by the transducers being transmitted to the electronic control means.

23. A system according to claim 22, wherein the central control unit comprises first programming means for inputting information about the mutual positions of the wheeled units or bogies on said object.

24. A system according to claim 22 or 23, wherein each bogie control device comprises second programming means for inputting information about the orientation of the associated wheeled unit in relation to a selected common axis when mounted on said object.

25. A system according to any of the claims 22 - 24, wherein the signal transmitting means comprise galvanic isolating device.

26. A system according to claim 25, wherein the galvanic isolating device comprises an optocoupler.

27. A system according to any of the claims 22 - 26, wherein the central control unit comprises means for transforming output command signals to be transmitted to the bogie control devices at the wheeled units or bogies into serial digital strings.

28. A system according to any of the claims 22 - 27, wherein the electronics of the electronic control means is divided between the central control unit on the one hand and each of the bogie control devices on the other hand so as to minimize data transmission via the signal transmitting means.

29. A system according to any of the claims 22 - 28, wherein the driving and steering means of the wheeled units or bogies comprise motors selected from the group consisting of electric motors, hydraulic motors, pneumatic motors, steam engines thermodynamic engines and internal combustion engines.

30. A system according to any of he claims 22 - 29, wherein the wheeled units or bogies of the system are substantially identical.

31. A system according to any of the claims 22 - 30, wherein each wheel member is of the type comprising a support member, a wheel element and a drive shaft, the drive shaft having a drive means engaging a drive surface on the wheel element to rotatably drive the wheel element relative to the support member, the drive shaft having a longitudinal axis

and the engagement of the drive means and drive surface defining in vertical cross-section a line of engagement that is at an acute angle to the longitudinal axis, the wheel element having a surface contacting portion extending about its periphery and positioned such that it is intersected by the line of engagement substantially at where it contacts a supporting surface.

32. A system according to claim 31, wherein the drive shaft is substantially normal to the supporting surface.

33. A system according to claim 31 or 32, wherein the line of engagement is at an angle of between about 10° and 25° to the substantially normal longitudinal axis of the drive shaft.

34. A system according to any of the claims 31 - 33, wherein the support member has a substantially hemispherical outer surface with the wheel element rotatable about an axle extending normal to an inner surface of the hemispherical member.

35. A method of rendering an object self-propelling by means of a drive wheel system according to any of the claims 24 - 34, said method comprising:

mounting at least two of said wheeled units or bogies on the object at selected locations thereof and with selected orientations in relation to a certain direction,

programming said first programming means by inputting information about the mutual positions of the wheeled units or bogies on said object,

programming said second programming means by inputting information about the orientation of the associated wheeled unit in relation to a selected direction, and

inputting command signals to the central control unit by means of the actuating device so as to move the vehicle along a desired path.

36. A method according to claim 35, comprising basing the information about the mutual positions of the wheeled units or bogies in relation to an actual or imaginary co-ordinate system on said object.

37. A method according to claim 36, wherein said selected direction is one of the axes of the co-ordinate system.

38. A method according to any of the claims 35 - 37, wherein the electronic control means are pre-programmed to ensure that the steering means are moving all wheel members of the wheeled units or bogies mounted on the said object such that any time during driving all wheel members are either moving along substantially parallel lines or substantially concentric arcs of circles.

39. A method according to any of the claims 35 – 38, wherein the command signals are transmitted from the central control unit to the bogie control devices at the wheeled units or bogies as serial digital strings.

40. A method according to any of the claims 35 - 39, wherein the object to be rendered self-propelled is a manually driven vehicle having a plurality of supporting wheels, at least some of these wheels being replaced so as to have the vehicle supported by at least two of said wheeled units or bogies and freely swivelling wheels or casters only.

41. A method according to any of the claims 35 - 40, wherein the central electronic control unit is mounted on the object.